

**H-L<sub>w</sub>-V Equilibrium Measurements for Ternary CH<sub>4</sub>-N<sub>2</sub>-CO<sub>2</sub> Mixed Hydrate System**

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The vast natural gas hydrate deposits on the deep seafloor have attracted the attention of many researchers in energy and environmental fields because of recovering a huge amount of CH<sub>4</sub> stored in the hydrate-bearing sediments. Separately, CO<sub>2</sub> hydrates in deep ocean CO<sub>2</sub> storage are also considered. To attain both of these things at the same time, the swapping mechanism, the replacement of CH<sub>4</sub> hydrate with the sequestration of flue gas N<sub>2</sub>+CO<sub>2</sub>, has investigated into the actual application in recent years. However, the phase equilibrium data of ternary CH<sub>4</sub>-N<sub>2</sub>-CO<sub>2</sub> mixed hydrate is essential to the swapping mechanism, but not yet available. In the present study, phase equilibrium measurements were carried out for ternary CH<sub>4</sub>-N<sub>2</sub>-CO<sub>2</sub> mixed hydrate system and the feed gas molar ratio of N<sub>2</sub> to CO<sub>2</sub> of 8:2 will be fixed according to conventional flue gas type of power plant. This hydrate system cannot form structure II at all composition, because the binary mixed N<sub>2</sub>-CO<sub>2</sub> hydrate was known to form structure I at compositions above 0.2 mole fraction of CO<sub>2</sub>. Gas chromatography would be introduced to hydrate phase compositions of the ternary mixed hydrates measured at the corresponding vapor phase compositions.